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# *Office of River Protection*

## *S-102 Briefing to the Oregon Hanford Cleanup Board*

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**CH2MHILL**  
Hanford Group, Inc.



**Bechtel National, Inc.**



**Washington Group  
International**



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safety



performance



cleanup



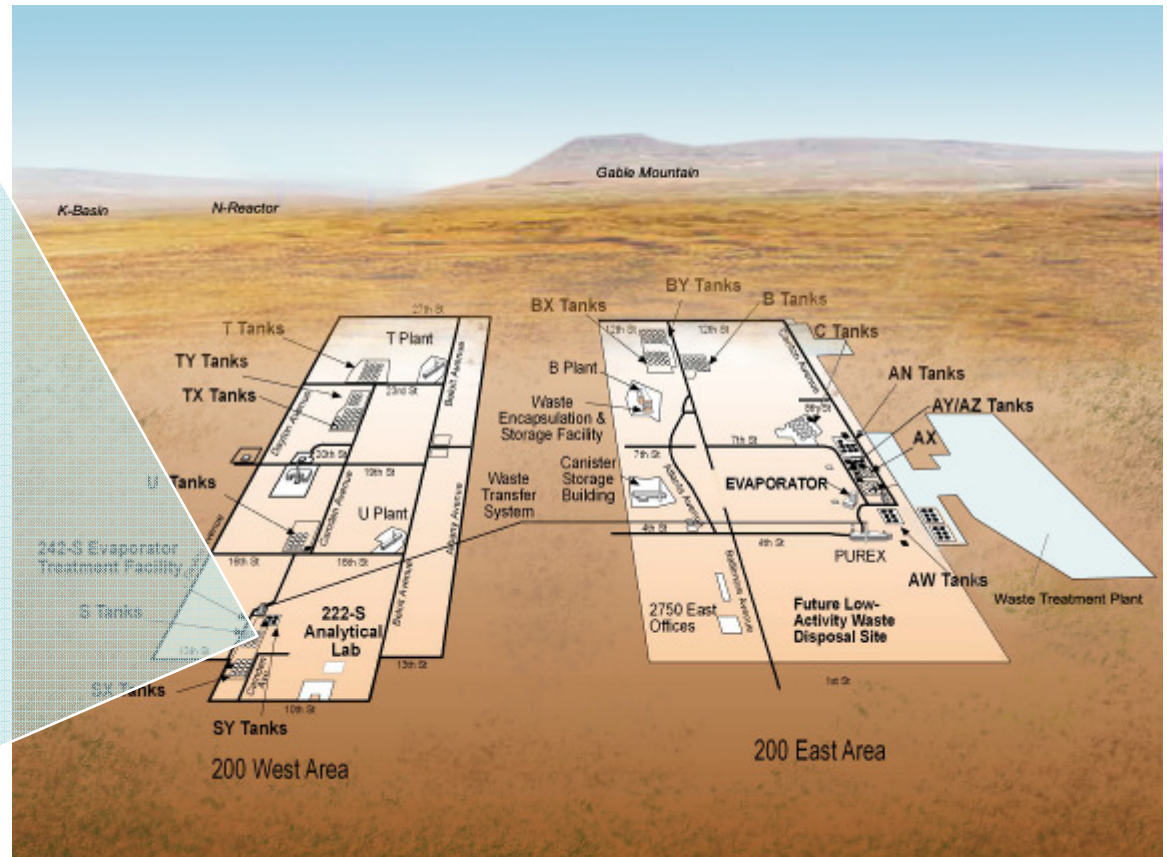
closure

# S-102 Event Site Overview



S-Farm

S-102



200 Area Tank Farms



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## *Spill Area*

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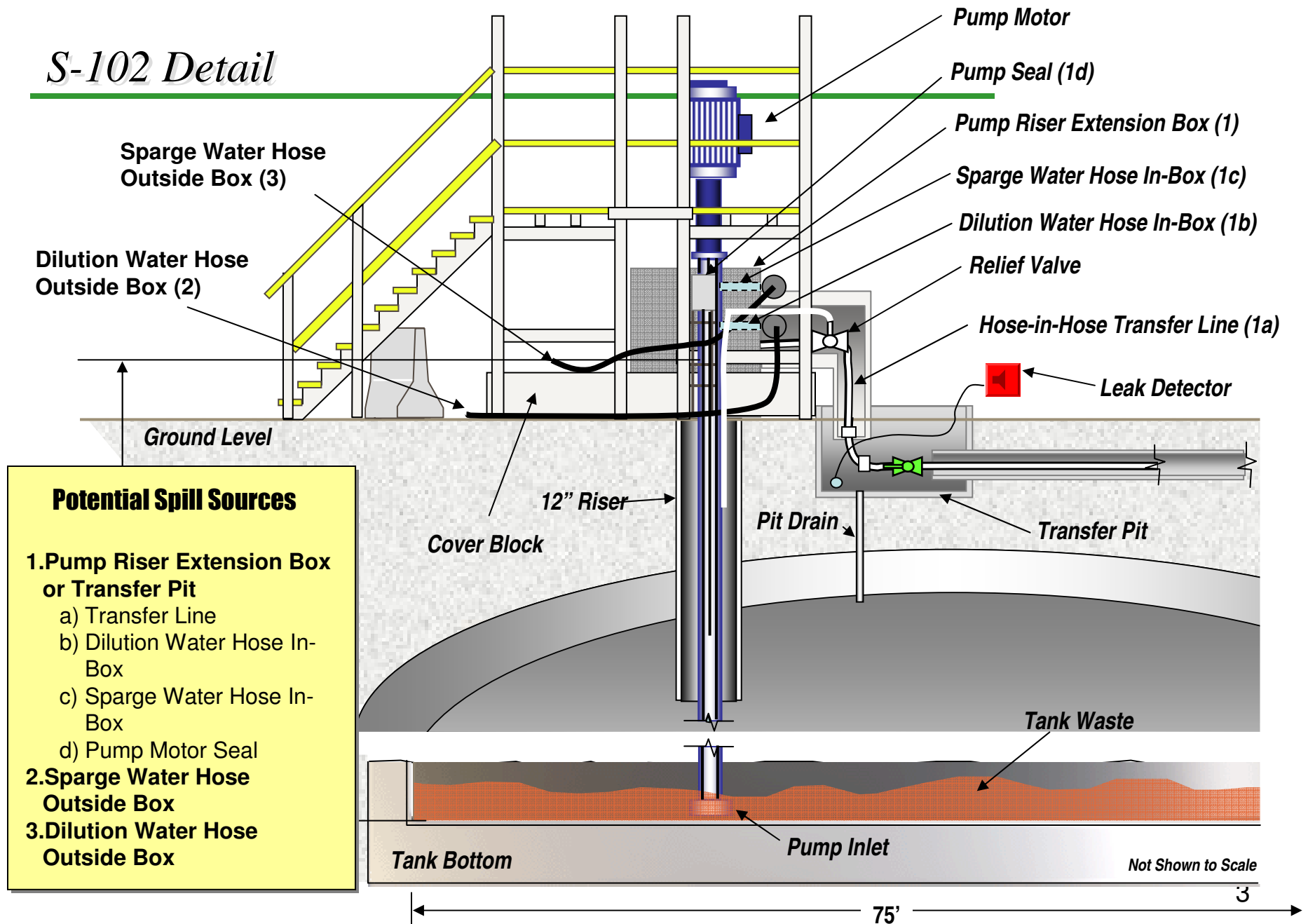


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## S-102 Detail



## *Summary – Dilution Hose Most Probable Source*

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- Spill occurred between 2:05 and 2:20 AM while pump was operated in reverse direction
  - Personnel, including HPT, out of field during this time. Would have noticed splash before that time
  - Abnormal readings after that time
  - Pressure in transfer system measured at static head from SY-102 until 20 seconds into last reverse pump run, when it went to zero (air bubble coming down from SY-102 anti-siphon)
- Splash pattern consistent with release near dilution hose near NW corner of pump pit
  - On jersey barrier
  - On chair
  - On stairs
  - Not on wood platform, top of pump box, top of pump pit
  - Sparge hose not in vicinity of source of spray pattern
- Spill pool consistent with near surface release
  - Bathtub ring along north side of pump pit between pit and dilution hose
  - No discoloration near release points from pit or pump box
- Radiation reading consistent with dilution hose
  - Higher readings where hose is off ground, out of spill
  - Sparge hose readings at background where off ground, out of spill
- Transfer pit and pump box unlikely sources of spill
  - Pump box drains into transfer pit OR into the tank
  - Leak detector in transfer pit
  - Transfer pit drains to tank
  - Transfer pit is below grade with a void volume of over 1,500 gallons



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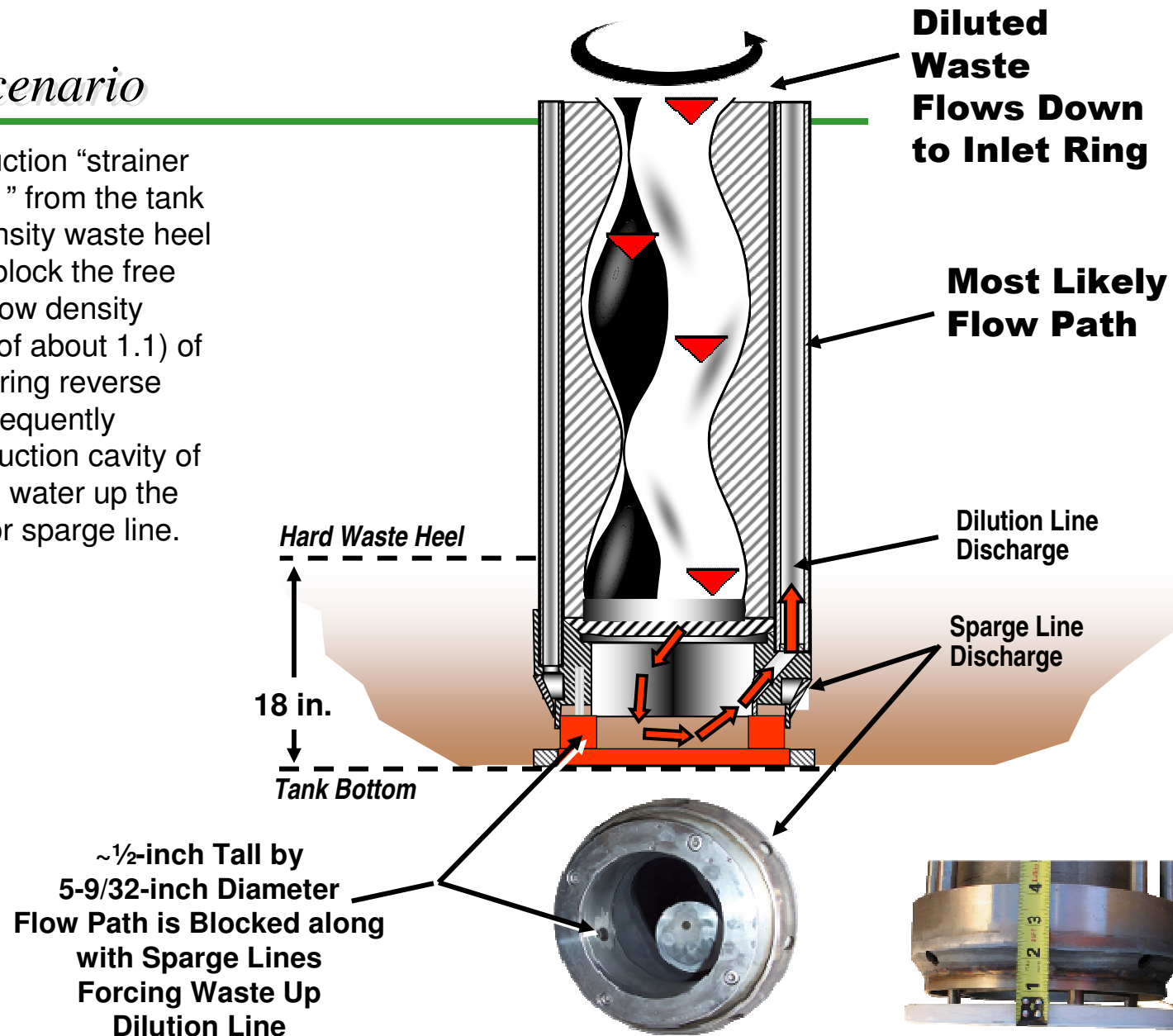
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## *Probable Scenario*

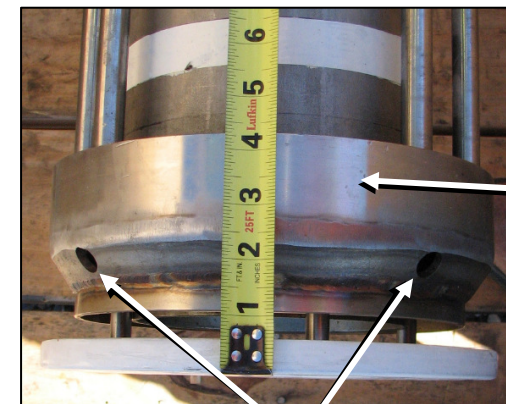
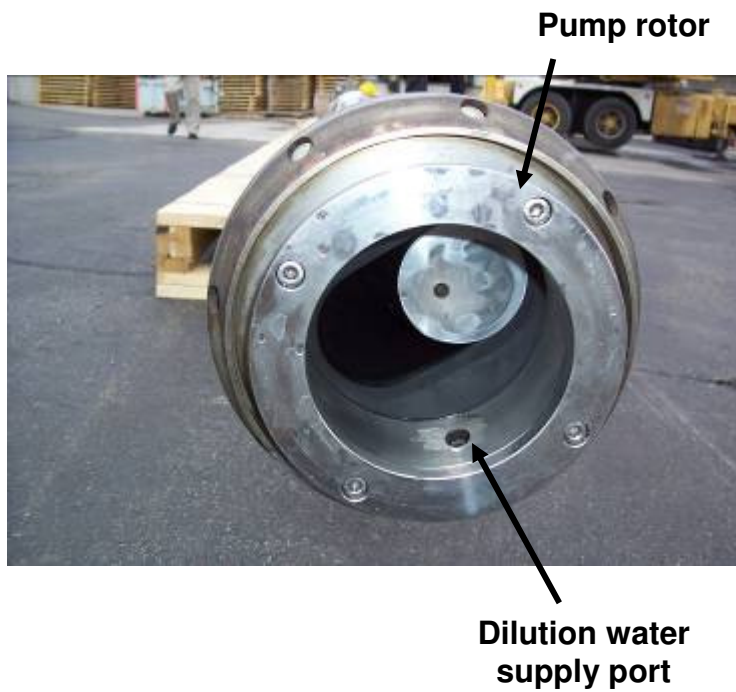
With the pump suction “strainer plate” within  $\frac{1}{2}$  - 1” from the tank floor, the high density waste heel was sufficient to block the free flow of relatively low density (Specific Gravity of about 1.1) of transfer waste during reverse rotation and subsequently pressurized the suction cavity of the pump, forcing water up the dilution line and/or sparge line.



*Bottom and Side-View Photo of Pump Inlet*

## *Pump Inlet Nozzle*

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Sparge  
ring

Sparge water/air  
distribution  
ports

## *Immediate Actions*

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- Spill area stabilized (Soil Segment and Safeguard)
- Spill area surrounded by locked fence
  - Postings for: high radiation, high contamination, respiratory protection required for entry
- Spill area monitored for potential spread of contamination
  - Surveys every four hours at high radiation/high contamination area boundary
  - Weekly samples inside the fenced area including contamination and dose rate surveys
- Industrial Hygiene monitoring



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## *Recovery Action Plans*

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- Maintain control of contamination within HRA/HA
- Reduction of the source term
- Remove above ground equipment
- Excavate/remove contaminated soil
- Remove miscellaneous equipment and decontaminate permanent equipment
- Backfill with clean soil
- Perform final condition assessment



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## Direct Cause, Root Cause and Judgment of Needs

- The direct cause was leakage of waste from the retrieval pump system in S-102, due to the failure of a utility hose in the dilution line as a result of overpressure
- The root cause was the pump system did not have mechanism to prevent backflow and the subsequent over pressurization of the hose, although required
- Judgment of needs include:
  - improving engineering, design and testing of waste retrieval equipment, and revision of procedures and processes for review of engineering designs
  - an engineering analysis of whether the retrieval pump can continue to be safely operated in tank S-102
  - better analysis of high-probability/low-consequence accident scenarios in the tank farms, improving procedures for responding to abnormal events in the tank farms, and correcting inconsistencies in the implementation of take cover protective actions
  - establishing and implementing better protocols for industrial hygiene monitoring, strengthening communications between emergency responders and the on-site medical provider, and improving medical monitoring for individuals with health symptoms and/or complaints following an accident
  - better defining and implementing a process for identifying potential leaks or spills and strengthening radiological conduct of operations in the tank farms
  - improving oversight of waste retrieval activities to ensure stringent nuclear safety and other requirements are met



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## *Corrective Action Plan*

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- Conduct extent of condition reviews
- Investigate causes of spill event (DOE Type A Accident Investigation and contractor investigations)
- Develop Corrective Action Plan
- Cleanup spill site
- Improve DOE oversight of contractor radiological control practices, engineering and operations



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